The Readout System for the PHENIX Pad Chambers

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Abstract

The pad chambers in PHENIX have a large number of channels (170000). In addition, the front-end electronics have to be mounted on the outer surface of the wire chamber, in the path of the particles. To meet these challenges, two new integrated circuits were developed. The detector signal is processed by an analog chip which has 16 parallel channels, each having an amplifier followed by a discriminator. The yes/no results from 3 analog chips are stored in a digital memory chip, awaiting a trigger decision. The chip also provides local storage of 5 events pending readout. The three analog and one digital chip are mounted with the chip-on-board technique on 100 micron thin PC-boards, which constitute 0.2a radiation length. The output from the memory chip is serial to the edge of the detector, where data is received and formatted for convenient transfer from the detector via fiber optics. All functions of the system are programmable remotely. The system architecture, and the performance of individual components and of the full-scale system are presented.

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